

CONTROLLED DELIVERY COMPOSITIONS AND PROCESSES FOR TREATING ORGANISMS IN A COLUMN OF WATER OR ON LAND

This application is a continuation in part application of U.S. patent application Ser. No. 08/409,301, filed Mar. 24, 1995, now abandoned, which is a continuation in part application of U.S. patent application Ser. No. 08/406,344 filed Mar. 17, 1995, now abandoned, both of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of Invention

The present invention is directed to compositions and processes for controlled delivery of bioactive agents to a population of aquatic organisms located in any planar or volumetric segment of a column of water by ground or aerial application techniques. Organisms of special interest are disease-carrying or biting or non-biting nuisance insects, and parasitic animals or plants, especially weeds. Compositions for controlled delivery of bioactive agents to terrestrial organisms are also described.

2. Description of Related Art

Various methods have been devised for delivering biologically active materials to control pests and vegetation. For example, Yaffe et al., U.S. Pat. No. 3,274,052 describes a process and a composition in which molten droplets of a normally solid toxicant are sprayed on the surface of a granular carrier whereupon they adhere to and solidify on the surface of the carrier as an adherent coating. When employed for treating aquatic environments, the specific gravity of the granules, and the rate of release of the toxicant is adjusted during the manufacture to provide surface, intermediate or bottom contact, or penetration into mud to control the specific organisms involved. Neither methods nor compositions are described for adjusting the specific gravity.

Hedges et al., U.S. Pat. No. 3,917,814, describes a non-poisonous insecticidal composition consisting of diatomaceous earth having a sorptive silica gel adhered to the surface.

Jacobson et al., U.S. Pat. No. 5,180,585, describes an antimicrobial composition consisting of inorganic core particles coated with a metal or metal compound having antimicrobial properties.

Thies et al., U.S. Pat. No. 4,464,317, describes a process for encapsulating a pesticide with an inorganic silicate coating. The encapsulated materials according to the inventors are capable of fragmenting upon storage in water to provide controlled release of a pesticide such as a mosquito control agent. Non-encapsulated materials were shown to have about half the active life of the encapsulated materials.

Levy, U.S. Pat. Nos. 4,818,534; 4,983,389; 4,983,390; and 4,985,251, describe various insecticidal, herbicidal, terrestrial, and flowable insecticidal delivery compositions based on bioactive materials and superabsorbent polymers.

One of the problems encountered in delivering bioactive materials to aquatic environments is that the aquatic organism to be treated is not immediately susceptible to being contacted with the bioactive material because of its location in a column of water either at the surface, the bottom, or some intermediate region in between. Because of the specific gravity of the bioactive material, in many instances it cannot be targeted to precisely treat the organisms of interest

in the water column. By way of example, bioactive materials that have a specific gravity greater than water will generally be ineffective for treating aquatic organisms at the surface of a column, and vice-versa. Aquatic organisms that persist at some intermediate level are also difficult to treat for the same reason.

The foregoing illustrates that various delivery systems have been devised for bioactive materials, and the need to have a controlled delivery system suitable for delivering these materials to aquatic organisms. Although there is some suggestion that by adjusting the specific gravity of a toxicant composition of matter, it would be suitable for delivering the toxicant to an aquatic environment either at the surface, the bottom or at some intermediate level, the means for adjusting the specific gravity have not been disclosed.

Accordingly, the present invention is directed to compositions and processes for treating a population of one or more aquatic organisms in a column of water in which the foregoing and other disadvantages are overcome.

The present invention is also directed to compositions and processes for pretreating a dry (preaquatic) habitat area before it has been flooded by rain or tides, and which is a breeding site for the target aquatic organism(s), i.e. a pre-flood area. Pretreating a flooded aquatic habitat area before the target aquatic organism(s) breed is also within the scope of the invention, as well as flooded habitats where the organisms exist.

The foregoing illustrates that various delivery systems have been devised for bioactive materials, and the need to have a controlled delivery system suitable for delivering these materials to one or more terrestrial organisms, i.e. non-aquatic organisms. Although there are some systems that are available to provide control of these organisms, it would be advantageous to provide additional compositions for addressing the problems caused by such organisms whether they are plant, insect, or other animal pests.

Accordingly, the present invention is directed to compositions and processes for treating one or more terrestrial organisms in which the foregoing and other disadvantages are overcome.

Specifically, the advantages sought to be obtained according to the present invention are to provide compositions of matter or processes for treating a population of one or more aquatic organisms in a column of water, or one or more terrestrial organisms. Throughout the specification it is intended that the terms "treat," "treating," or "treatment" are intended to mean enhancing development of an organism, prolonging life of an organism, stopping or reversing the development of a condition in an organism, stopping the development of an organism, or eradicating an organism.

SUMMARY OF INVENTION

These and other advantages are realized by the present invention which comprises compositions of matter and processes which substantially obviates one or more of the limitations and disadvantages of the related art.

Additional features and advantages of the invention will be set forth in the written description which follows, and in part will be apparent from this description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the compositions of matter and processes particularly pointed out in the written description and claims hereof.

To achieve these and other advantages, and in accordance with the purpose of the invention, as embodied and broadly